

U.S. Department of Energy

ARM Education and Outreach Resources

The mission of the U.S. Department of Energy's (DOE) Atmospheric Radiation Measurement (ARM) Program Education and Outreach effort is to promote basic science education and community environmental awareness, with an emphasis on global climate change. Since its beginning in 1992, ARM Education and Outreach has focused on curricula enrichment for regional and local schools near each of the ARM sites. The ARM Program has primary sites in the Southern Great Plains, Tropical Western Pacific, and North Slope of Alaska. ARM Education and Outreach focuses on three goals: student enrichment, teacher support, and community outreach.

Student Enrichment – ARM Education and Outreach develops curricula relevant to each region and culture by integrating basic science with traditional ecological knowledge (TEK). Traditional ecological knowledge is a system built over generations to understand the environment, as people depend on the land and sea for food, materials, and culture. Based on the observations and experiences of elders, TEK is relied upon by many indigenous people for survival and self-sufficiency. Science taught in conjunction with TEK demonstrates respect for local culture and provides students with a familiar context for learning.



Students in the Tropical Western Pacific watch a demonstration by ARM technicians.



North Slope of Alaska teachers attend an ARM teacher workshop.

Teacher Support – Communication with local educators from each region is essential for the enrichment of science education and curricula. ARM Education and Outreach assists with defining science standards for education and addresses local needs concerning environmental education by organizing workshops for teachers. Since 1998, nine workshops have been held in the Tropical Western Pacific and on the North Slope of Alaska. Teacher workshops include tours of ARM sites, presentations on climate change, and demonstrations of activities teachers can use in their classrooms.

Community Outreach – ARM Education and Outreach recognizes the value of traditional knowledge of the environment and climate change. An important vehicle for community outreach involves ARM-sponsored workshops and community meetings. Other efforts include the design and installation of interactive kiosks, which serve as educational tools to increase understanding of climate, climate change, and local impacts. These computer-based kiosks integrate ARM science with traditional knowledge from elders in the local community.



Newsletter

The *Climate Education Update* newsletter is distributed three times a year to students and teachers at ARM site locations. The newsletter is filled with interesting articles about the science of climate change, how it affects the lives of people, and what is being done to protect the environment. A section of the newsletter is dedicated to traditional knowledge and features interviews that offer a local perspective on climate change. A student activity demonstrating the topics discussed in the newsletter is included for use in the classroom. Each ARM site location has a mascot who makes frequent appearances in the newsletter.

Professor Polar Bear from the North Slope of Alaska might drop in for a lesson on coastal erosion. Teacher Turtle from the Tropical Western Pacific knows a lot about rising sea levels, and P.I. Prairie Dog from the Southern Great Plains likes to teach students about changing habitats due to global warming!

Lessons and Activities

ARM Education and Outreach creates interesting lessons on weather and climate change. Each lesson is accompanied by a fun, hands-on activity for students. The activities include a list of materials, a step-by-step procedure, and a short summary of important concepts. The lessons and activities are posted on the ARM Education Center web page and can be easily accessed by teachers.

Educational Web Page

Learning and teaching about climate change is easy and fun at ARM's Education Center web page. For educators, the web page is a great resource for downloading lessons and other materials. Updates are made frequently with new information and activities for classroom use. Students and adults will find the

site useful in learning about global warming, El Niño, greenhouse gasses, and much more. An outstanding feature of the web page is *Ask a Scientist*, which gives users an opportunity to submit a question to an ARM scientist and receive a helpful answer. Questions are answered on a daily basis, and frequently asked questions are posted with the answers in the "past questions" section. Our web address is "<http://www.arm.gov/docs/education.html>".

Curriculum Modules

In collaboration with several agencies and universities from the Pacific, ARM Education and Outreach published two curriculum enrichment books for teachers in the Tropical Western Pacific. "Climate Change and Sea Level," is specifically designed for teachers in the Pacific region but is a great resource for teachers everywhere. The curriculum addresses the physical (part one) and social (part two) science of climate change. The modules contain basic science concepts and associated lessons and activities on the atmosphere, ocean, weather and climate, and climate change. The curriculum books have been distributed in fourteen countries, including schools in Nauru and Papua New Guinea, and are available to teachers by writing to ARM Education and Outreach.

Interactive Kiosks

The latest attraction in ARM Education and Outreach is an interactive kiosk on climate change located at the Iñupiat Heritage Center in Barrow, Alaska. Designed as an educational tool for the community of Barrow, the kiosk features interviews about climate change with educators, subsistence hunters, and elders from the Barrow community accompanied by interviews with

anthropologists, ARM researchers, and other scientists. The kiosk demonstrates how both traditional and scientific knowledge of the environment are key to understanding climatic issues. Users have the option of listening to the kiosk in English or Iñupiaq, the native language of the Iñupiaq people.



Children view the Alaska kiosk.

The kiosk software is available to the public on CDROM by writing to ARM Education and Outreach. The next interactive kiosk is being developed for the Tropical Western Pacific. Our film and interview crew have visited communities in Nauru, Samoa, and Papua New Guinea and the kiosk is already in the editing stage. We look forward to installing this kiosk in the near future!

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